Image partitioning into convex polygons
(Supplementary Materials)

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1. Additional evaluation on Berkeley dataset

We compared the performance of our method with SLIC [1], SEEDS [4] and ERS [2] on two additional quality criteria: the ASA metric (the Achievable Segmentation Accuracy [4]) and the precision-recall. As illustrated in Fig. 1,The ASA results on the Berkeley dataset evolve in a similar way than the boundary recall tests presented in the paper. The order of magnitude in however less important as our method is globally 1% less accurate than the best score of the three superpixel methods.

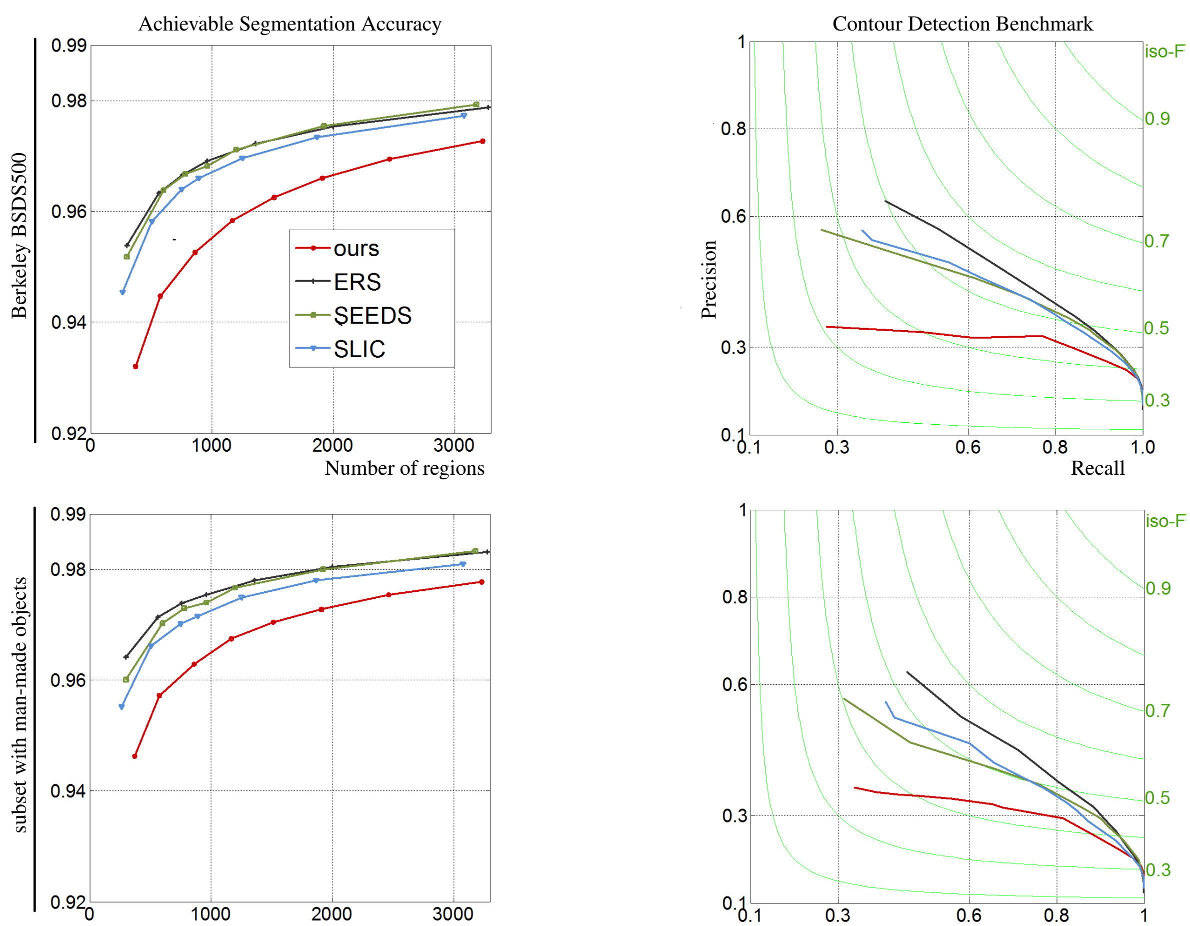

Figure 1. Additional quality criteria from Berkeley dataset.

2. Applications

We conducted some short experiments on two concrete vision problems, ie corner detection and object polygonalization, to illustrate the applicative potential of our algorithm.

2.1. Object polygonization

Starting from a polygonal partitions computed by our algorithm, we used a binary Markov Random Field to label each polygon as inside or outside some objects of interest. The interface between inside and outside regions directly forms polygonal contours, contrary to existing object polygonization methods that require complex algorithms in practice, eg [3]. The MRF formulation is based on a standard 2-term energy taking into account image consistency (radiomatric information) and pairwise interactions (smoothness via a Potts model). Fig. 2 illustrates the potential of this strategy compared to [3] for extracting roof contours from aerial images.

2.2. Corner detection

We also tested our algorithm for detecting corner points in images, more precisely L- and Y-junctions. This can be done by a simple local analysis of the junction-anchors from a polygonal partition of our algorithm. In particular, we detect L-junctions (respectively Y-junctions) when a junction-anchor is generated from 2 line-segments (resp. 3 line-segments). As illustrated in Figure 3, we obtained detection rate of similar order of magnitude than a specialized algorithm [5] on both synthetic and real images.

References

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[3] X. Sun, M. Christoudias, and P. Fua. Free-shape polygonal object localization. In *ECCV*, 2014. 2, 3

[4] M. Van den Bergh, X. Boix, G. Roig, B. De Capitani, and L. Van Gool. SEEDS: Superpixels extracted via energy-driven sampling. In *ECCV*, 2012. 1

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Figure 2. Object polygonization. Visual comparison of polygonal contour extraction by our method and by [3] from aerial images. The class of interest corresponds to building roofs.

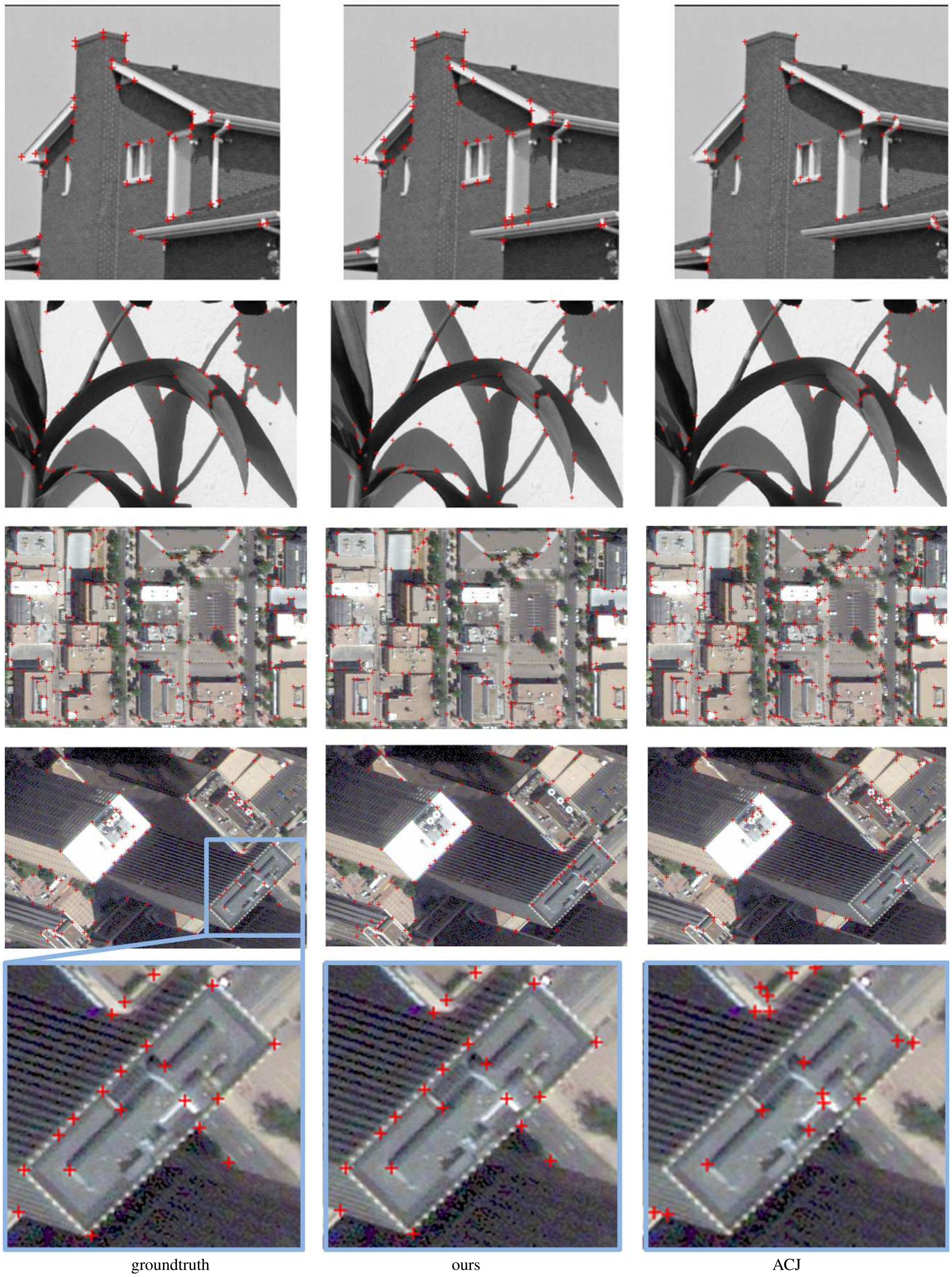

Figure 3. Corner detection. Visual comparison of corner detection by our method and ACJ [5]. Our method produced similar results on both synthetic and real satellite images. In particular, for man-made objects as buildings, important corners of the roofs are correctly detected by our method.